

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2008-0149-048

FOR  
IN-SITU GROUNDWATER REMEDIATION AT SITES WITH VOLATILE ORGANIC  
COMPOUNDS, NITROGEN COMPOUNDS, PERCHLORATE, PESTICIDES,  
SEMI-VOLATILE COMPOUNDS AND/OR PETROLEUM HYDROCARBONS

ELK GROVE CLASS III LANDFILL  
SACRAMENTO COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring an in-situ groundwater remediation project to address Volatile Organic Compounds (VOCs) at the Elk Grove Class III Landfill. This MRP is issued pursuant to Water Code Section 13267. The Discharger (County of Sacramento Department of Waste Management and Recycling) shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. As appropriate, Central Valley Regional Water Quality Board (CVRWQCB) staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

### **GROUNDWATER MONITORING**

As shown on Figure 1, this treatment system project (HRC Injection Program) is associated with eight existing monitoring wells (designated MW-2, MW-3, MW-6, MW-7R, MW-12, EW-1, EW-4, and EW-5), two existing injection locations (designated PZ-2 and SMVE-3), and three new injection wells (designated HRC-1, HRC-2, and HRC-3). The groundwater monitoring program for these wells and any treatment system wells installed or added to the project subsequent to the issuance of this MRP, shall follow the schedule below. All monitoring shall be conducted in accordance with the sample collection and analysis procedures in the approved April 2000 report for Low-flow micro-purging and as presented in the 2012 Annual Monitoring Report which includes quality assurance/quality control standards.

The monitoring wells and injection wells shall be sampled according to the schedule in Table 1 and the samples analyzed by the methods in Table 2. Sacramento County also conducts routine groundwater, surface water and soil gas monitoring pursuant to MRP R5-2013-0134. In the case of duplicative monitoring between the two monitoring and reporting programs, one sample may satisfy the requirements of both monitoring programs. However, the results shall be reported separately in monitoring reports required for each Order.

**Table 1: Sampling Frequency and Constituent Suite**

Well Number	Frequency	Constituent Suite(s) <sup>2</sup>	Monitoring Objective
HRC-1, HRC-2, HRC-3, PZ-2	Before Injection, Quarterly/Semiannual <sup>3</sup>	A, B, C	Treatment Zone
MW-2, MW-3, MW-7R	Monthly/Quarterly <sup>4</sup>	A <sup>5</sup> , B, C <sup>7</sup>	Transition Zone
MW-6, MW-12, EW-4, EW-5	Semiannual	A <sup>6</sup> , B, C <sup>8</sup>	Compliance
EW-1 <sup>1</sup>	Semiannual	A, B	Background

1 This well will be replaced as background well by MW-13 when constructed and when sufficient data from MW-13 has been collected. The Discharger shall develop new water quality protection standards (WQPS) using data collected from MW-13. Data set must contain at least eight sampling events to conduct a meaningful statistical analysis to develop background concentrations limits. See Figure 1 for proposed MW-13 location.

2 Constituent suite components listed in Table 2.

3 Wells designated as Quarterly/Semiannual shall be sampled quarterly for at least four quarters after an injection event, and then semi-annually in the second and fourth quarters (Apr-Jun, Oct-Dec).

4 Wells designated as Monthly/Quarterly shall be sampled monthly for at least three months after an injection event. Following the monthly sampling frequency wells will be sampled quarterly for at least two quarters, and then semiannually in the 2nd and 4th quarters.

5 Only if significant methane (>28 mg/l above pre-injection condition) is detected in the treatment zone.

6 Only if significant methane (>28 mg/l) is detected in the transition zone.

**Table 2: Analytical Methods**

Constituent	Method <sup>1</sup>	Maximum Practical Quantitation Limit <sup>2</sup> (µg/L)
<b>Suite A</b>		
Volatile Organic Compounds	EPA 8260B	0.5
Ethanol <sup>4</sup>	EPA 8260B	5
<b>Suite B</b>		
Total Dissolved Solids	EPA 160.1 or SM2540C	15,000
Total Organic Carbon	EPA 415 or SM5310B	3000
Chloride	EPA 300	1000

Nitrate (as N)	EPA 300	230
Sulfate	EPA 300	1000
Dissolved Metals <sup>5</sup>	EPA 200.7	Various
<b>Suite C</b>		
Methane	EPA RSK 175	1.0

1 Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

2 All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as an estimated value. Refer to MRP R5-2013-0134 for approved concentration limits.

3 Suspected breakdown product of the HRC injectant, detected at previous injection event.

4 Metals include arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver and zinc. Samples to be analyzed for dissolved metals shall be filtered in the field. Add analysis for hexavalent chromium to individual well analysis requirement if chromium is detected above 10 ug/l site wide background limit (Refer to MRP R5-2013-0134 for approved concentration limits) in any sample from that well.

### FIELD SAMPLING

In addition to the above groundwater sampling and analysis, field sampling and analysis shall be conducted each time a monitoring well or extraction well is sampled. The sampling and analysis of field parameters shall be as specified in Table 3.

**Table 3: Field Sampling Requirements**

Parameters	Units	Type of Sample
Groundwater Elevation	Feet, Mean Sea Level	Measurement
Oxidation-Reduction Potential	Millivolts	Grab/Flow-through Cell
Electrical Conductivity	uhmos/cm	Grab/Flow-through Cell
Dissolved Oxygen	mg/L	Grab/Flow-through Cell
pH	pH Units (to 0.1 units)	Grab/Flow-through Cell
Sulfide using a colorimetric test kit (EPA 376.2) sensitive to 0.02 mg/l.	mg/l	Grab (if odor detected)

The groundwater flow rate and direction in the uppermost aquifer and in any zones of perched water and in any additional portions of the zone of saturation being monitored shall be determined at least quarterly [Title 27, Section 20415(e)(15)].

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this MRP.

### DISCHARGE MONITORING

On a daily basis, the Discharger shall monitor the discharge of water and amendments that are injected into the groundwater according to the requirements specified in Table 4. Each amendment addition shall be recorded individually, along with information regarding the time period over which the amendment was injected into the aquifer.

**Table 4: Discharge Monitoring Requirements**

Parameters	Units	Type of Sample
Injected Volume	gallons per day	Meter
Amendment(s) Added	kilograms per day	Measured

### AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in Table 5. The analysis shall be done on the mixture of the amendment and distilled water at the estimated concentration that would be injected during the project. Analysis shall be performed once for the first injection of each calendar year.

**Table 5: Amendment Analytical Requirements**

Constituent	Method <sup>1</sup>	Maximum Practical Quantitation Limit <sup>2</sup> (µg/L)
Volatile Organic Compounds (VOCs)	EPA 8260B	0.5
Ethanol	EPA 8260B	5
Metals, Total <sup>3</sup>	EPA 200.7	Various
Total Dissolved Solids	SM2540B	15,000
pH	meter	NA
Electrical Conductivity	meter	NA

1 Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

2 All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported, and reported as an estimated value.

3 Metals include arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, silica, silver and zinc.

## **ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES**

The Discharger shall develop background values for concentrations of dissolved iron, dissolved manganese, metals, total dissolved solids and electrical conductivity in groundwater following the procedures found in CCR Section 20415(e)(10). Background values at each compliance well shall be calculated from data collected at each compliance well prior to upgradient HRC injection. The Discharger shall submit a proposal to update the background concentrations by **1 September 2014**.

## **REPORTING**

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. In addition, the Discharger shall notify the Regional Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction system. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Regional Board. As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

All monitoring reports shall conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30 and shall be submitted by hard copy and electronically to the State Water Board's Geotracker database.

### **Quarterly Monitoring Reports**

The quarterly reports shall be submitted by the 1st day of the second month following the end of each calendar quarter (i.e., by **1 February, 1 May, 1 August, and 1 November**) until quarterly reports are no longer appropriate pursuant to Table 1 or such time as the Executive Officer determines that the reports are no longer necessary.

The quarterly reports should include the following information:

- (a) The amendments injected, dates, volume, and injection locations.
- (b) For both monthly and quarterly sampling events, tabulated sample locations, analyses and results, including detection levels for undetected results.

- (c) A figure showing injection and sample locations.
- (d) Field calibration logs.

### **Semi-annual monitoring reports**

Semiannual reports shall be submitted by **the 1st day of the second month following the end of each reporting period (i.e., by 1 February and 1 August)**. These reports shall contain an evaluation of the effectiveness and progress of the remediation. The content of the Semiannual Reports may NOT be combined with the Semiannual Report required by Monitoring and Reporting Program R5-2013-0134 for the Elk Grove Class III Landfill. Separate reports shall be submitted for each Order. The Semiannual Reports required by this Order shall contain the following minimum information:

- (a) A description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;
- (b) Field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc.;
- (c) Groundwater contour maps for all groundwater zones, if applicable;
- (d) Pollutant concentration maps for all groundwater zones, if applicable;
- (e) A table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom;
- (f) A table showing historical lateral and vertical (if applicable) flow directions and gradients;
- (g) Cumulative data tables containing the water quality analytical results and depth to groundwater;
- (h) A copy of the laboratory analytical data report, which may be submitted in an electronic format;
- (i) The status of any ongoing remediation, including an estimate of the system operating time, the effectiveness of the remediation system, and any field notes pertaining to the operation and maintenance of the system; and
- (j) If applicable, the reasons for and duration of all interruptions in the operation of any remediation

system, and actions planned or taken to correct and prevent interruptions.

## **Annual Report**

An Annual Report shall be submitted to the Regional Board by **1 February** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation, and may be combined with the second semi-annual monitoring report, as long as the report cover page clearly states that the two reports have been combined into one. The Annual Report is a separate report required under this General Order and shall not be combined with the Annual Report required by MRP

R5-2013-0134. The Annual Report shall contain the following minimum information:

- (a) Both tabular and graphical summaries of all data obtained during the year;
- (b) Groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;
- (c) A discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;
- (d) An analysis of whether the pollutant plume is being effectively treated;
- (e) A description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;
- (f) An identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and
- (g) If desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by: **Original Signed by**  
PAMELA C. CREEDON, Executive Officer